11

Supporting Materials

California Education and the Environment Initiative

History-Social Science Standard 11.9.7.

United States and Mexico–Working Together

D R A F T
for discussion purposes only

California Education and the Environment Initiative

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Activity Masters

Visual Aids

Name: _____

Section 1: Multiple Choice (2 points each)
Instructions: Select the best answer and circle the correct letter.

1. One of the biggest environmental issues in the border region influencing relations between the United States and Mexico is:
   a. construction of new housing along the border
   b. availability of potable water
   c. transportation of goods across the border
   d. the Tijuana River watershed

2. What is the main reason population is growing so quickly in the border region?
   a. The land is very cheap.
   b. There are jobs in new industries.
   c. The climate and resources are changing.
   d. The rivers have less water in them.

3. Which of these is not an environmental issue for border cities in both the United States and Mexico?
   a. median household income
   b. air quality
   c. availability of potable water
   d. industrial growth

4. The Colorado River is an important natural resource for both countries because:
   a. Pesticides used in surrounding agricultural production are dumped in the river.
   b. Goods from the maquiladoras are transported on the river.
   c. The river water is important for industry, agriculture, and municipal use.
   d. All of the above.

5. The Border 2012 Program provides a way for:
   a. stakeholders in the border region to work on environmental issues together
   b. federal agencies to control and manage the Mexico's natural resources
   c. the U.S. government to clean up the border immediately
   d. none of the above

Name: _____

6. The main goal of the La Paz Agreement is to:
   a. pay for environmental projects in local communities
   b. enforce international environmental laws
   c. cooperate in addressing environmental issues in the border region
   d. increase the size of communities along the border

7. One of NAFTA's goals of is to:
   a. encourage population growth by increasing free trade
   b. enforce Mexican and U.S. environmental laws
   c. manage natural resources and national parks in both countries
   d. address environmental concerns related to industry in the border region

8. The Tijuana River watershed is an area in which there is binational cooperation on environmental issues because:
   a. The water in the river is running out.
   b. The health of the river affects both the United States and Mexico.
   c. Industries on both sides of the border influence the river.
   d. Cities on both sides of the border use the water in the river to drink.

9. Which of the following is not a factor that directly influences government decisions about natural resources in the border region?
   a. literacy rates
   b. job opportunities
   c. poverty
   d. human health

10. Which of the following will most likely have the biggest effect on the resources of the border region in the future?
    a. industrialization
    b. agriculture
    c. soil salinity
    d. population growth

Name: _____

Section 2: Short Answer (10 points each)
Instructions: In complete sentences, answer each of the following questions.

11. Describe one specific environmental issue in the border region, explain a problem related to that issue, and discuss how that problem influences relations between the United States and Mexico.

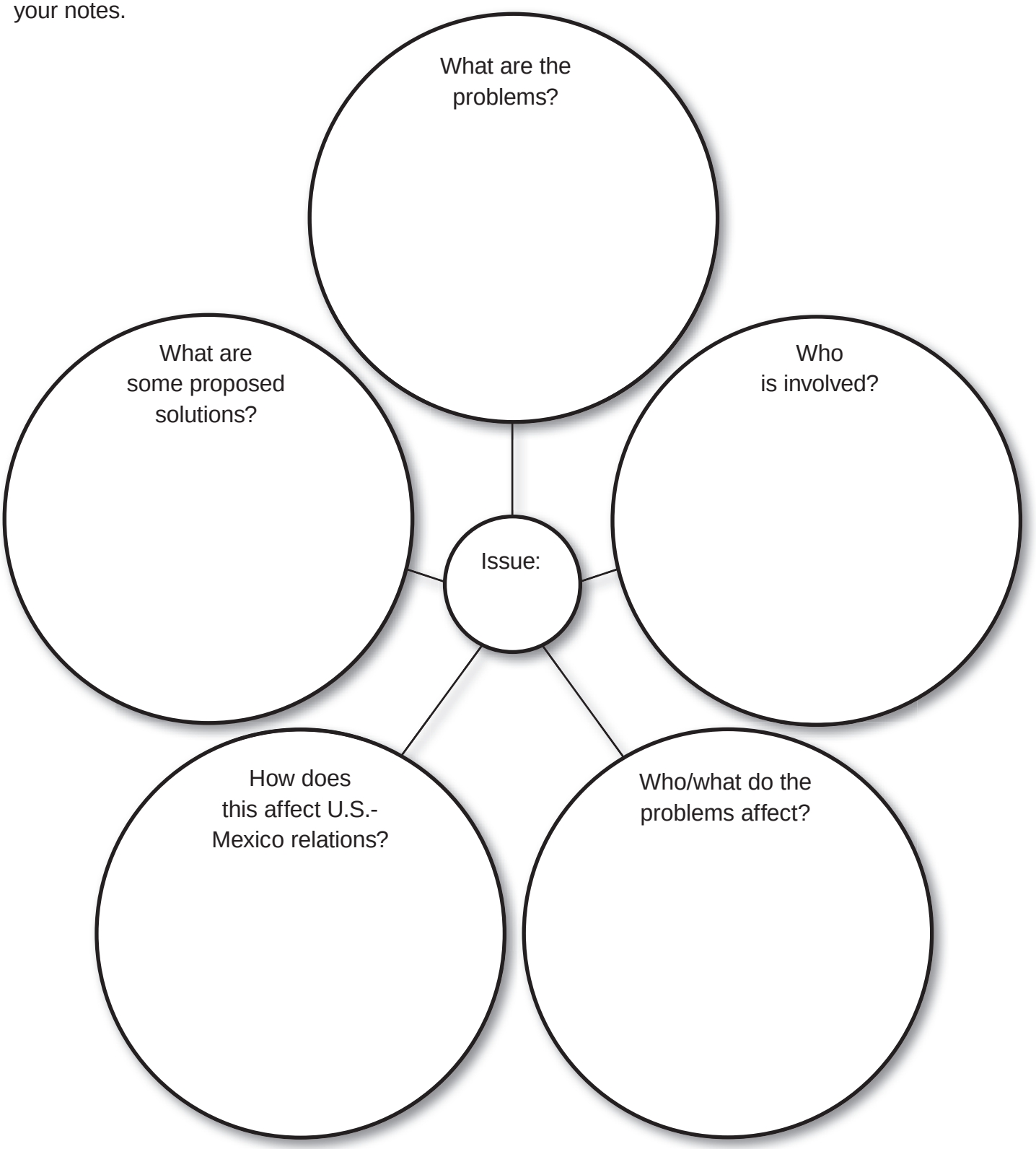
12. Choose two stakeholders in the border region who have different views on how to manage the natural resources in the region. Discuss the ways each stakeholder assesses and balances social, economic, and environmental factors when setting its goals.

Name: _____

13. Describe a particular treaty or agreement between the United States and Mexico related to improving the environment. Explain how the treaty or agreement influences life in the border region.

Name: _____

Instructions: Using all of your notes and assignments from the unit, create a concept map for one issue—water, air, or land/soil—in the border region. Be sure to use specific examples from your notes.



Allocation: Something, such as shared funds, that is distributed to individuals or groups according to a plan and specific purpose.

Aquifer: An underground layer of rock or sediment that holds usable amounts of groundwater.

Border region: A 62-mile (100-kilometer) wide area along the U. S.-Mexico international border, stretching 1,956 miles (3,148 kilometers) from California to the southern tip of Texas.

Convention: An agreement between nations.

Domestic: Relating to the home or everyday life in a household or in one's home country.

Emissions: The release of substances such as gases or particulates that contribute to air pollution. Other forms of emissions include noise, vibrations, light, heat, radiation, and odors.

U.S. Environmental Protection Agency: The U.S. government agency that implements federal laws designed to promote public health by protecting air, water, and soil from pollution.

Indigenous (or native): Originating in a particular region or country.

Industrialization: The changing of an area by creating industry, such as factories and power plants.

Infrastructure: The systems and facilities that are necessary for a human community to function. Infrastructure includes roads, sewage and water treatment plants, and power stations.

Lead: A heavy, highly toxic, bluish gray metallic element that bends easily and is used in car batteries, pipes, solder, and radiation shields.

Maquiladora: Mexican corporations that operate under a special program. Maquiladoras can be assembly plants, manufacturing facilities, food packing plants, or even call centers.

Median household income: A statistical value that divides household income into two segments: one half the population earning less than the median household income and the other half earning more.

Municipal: Relating to a town, city, or region that governs itself.

Outreach: Providing information or services to groups in society who otherwise might not have access to such information or services.

Particulate matter: Tiny particles of liquid and solids suspended in the atmosphere.

Population density: The measurement of population per unit area. Human population density is typically measured in units of people per square miles or kilometers.

Poverty rate: An estimated percentage of people lacking the income (money) necessary to meet their basic needs for health (food, shelter, clothing, and medical care).

Restoration: The process of returning something, from a work of art to an ecosystem, to an earlier or better condition. Ecological restoration is usually targeted at ecosystems that have been degraded, transformed, or destroyed as the result of human activities.

Salinity: The total amounts of salts dissolved in water. The average salinity of sea water is 35 parts per thousand.

Secretaria de Medio Ambiente y Recursos Naturales (SEMARNAT): The Mexican government agency that encourages the protection, restoration, and preservation of ecosystems, natural resources, and environmental goods and services.

Stakeholders: Individuals, groups, or organizations that have a vested interest in a particular action or decision.

Stewardship: Careful and responsible management of land, air, water, and biodiversity to ensure healthy and fully functioning ecosystems.

Treaty: An agreement or protocol between two or more nations to create or restrict rights and responsibilities.

Watershed: The region of land that drains water into a particular watercourse or body of water.

The Tijuana River

Part 1: A Shared Resource

If you walk along the sand at Imperial Beach, along with gulls and sunbathers you are likely to see bleach bottles, plastic toys, hypodermic needles, tires, oil containers, or even a refrigerator door. You also might see a yellow sign that says *Keep Out! Sewage Contaminated Water. Exposure May Cause Illness.* The San Diego County Department of Environmental Health closed the beach at the mouth of the Tijuana River for a total of 198 days in 2006. Environmental problems cross political borders at this special place where land, river, and ocean merge with two socially and economically disparate countries.

The Tijuana River is a trans-boundary watershed, with drainages running across the border between the United States and Mexico. Most of the river flows through Mexico, where it passes the cities of Tecate and Tijuana. It enters the United States 3 miles (4.8 kilometers) before draining into the Pacific Ocean. The river meets the sea at the protected Tijuana River National Estuarine Research Reserve. This diverse ecosystem lies at the junction of terrestrial, freshwater, and marine habitats. The reserve provides refuge for several threatened and endangered species.

Surfer on contaminated beach–Imperial Beach, California

Years ago, hiking upstream from the reserve, you might have been able to see dolphins and deer in the same day; however, those mammals are no longer found in the estuary.

Today, human activities threaten the Tijuana River watershed, which is designated as a biodiversity hotspot and a "Wetland of International Importance." The area is home to many species with limited distribution or small populations that face immediate threat.

Experts think that Tijuana's current population of 1.5 million will double by 2020. San Diego's population will increase by 1.3 million. This rapid growth means that more people will need homes, water, and places to dispose of wastes. Rapid growth is a particular problem for Mexico because it lacks infrastructure like adequate facilities for wastewater.

Wastewater flowing–Los Laureles Canyon, Tijuana, Mexico

Citizens of both countries move to the border region seeking work. Migration to the region has grown since the mid-1990s, when passage of the North American Free Trade Agreement (NAFTA) allowed the United States and Mexico to trade with limited tariffs. NAFTA led to an explosion in the number of maquiladoras—assembly plants. Many of these plants are American-owned factories, operating on the Mexican side of the border. There the owners can take advantage of Mexico's lower wages and more abundant labor supply, as well as less stringent enforcement of

Illegal dumping and wastewater–Tijuana, Mexico

environmental regulations. Most of the profits from the maquiladoras flow back across the border to American and multinational corporations.

Money is not the only thing that flows across the border. The byproducts of manufacturing flow into the river. And, Mexico lacks the infrastructure, funds, and environmental regulation to deal effectively with the industrial waste and toxic chemicals dumped on soil and into waterways. These toxins travel downstream, polluting both surface water and groundwater, as well as the coastal waters of the Pacific Ocean. Scientists have detected high levels of heavy metals in the river. As these metals move through food chains, they accumulate in the tissues of animals, including humans.

The growing need for housing is another problem resulting from economic growth in the region. Many housing developments have been built on crumbling hillsides above the river. Their construction has removed the vegetation that holds the hillsides in place. When rain falls, water runs off the concrete, rather than soaking into the ground. The resulting volume and velocity of water erode the hillsides and carry the soil into the river. This sediment load pulses into the river with each storm, choking the channel and threatening

Heron eating fish in polluted river

to bury the estuary in a layer of silt.

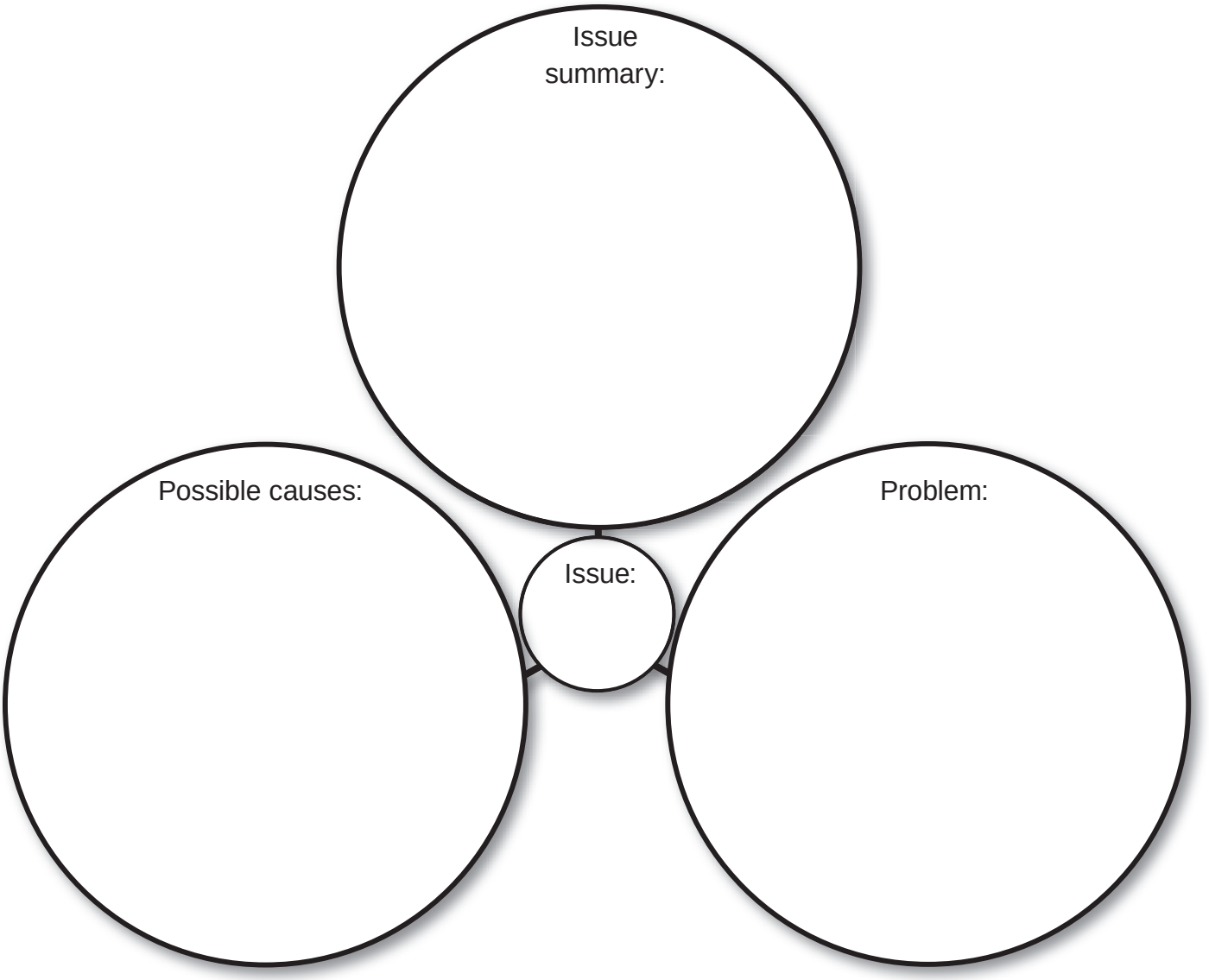
Sediment is not the only thing flushed downriver during a storm. Because Tijuana lacks adequate sewage treatment, with each rainstorm a million gallons of raw sewage overflow downstream from Tijuana. This enormous load of organic waste poses a human health problem. The torrents also sweep trash, plastics, and even discarded appliances into the river.

Debris overwhelms the border fence. The drainage gates in Smuggler's Gulch and Goat Canyon are open all the time, allowing the current to carry debris downstream, where it pollutes the estuary, litters the beach, and flows out to sea, causing even more problems. The water and sediment that flows into Goat Canyon is caught by large sedimentation basins at the head of the canyon on the U.S. side. The problems do not stem only from Mexico. Wastewater infrastructure in San Diego is old and in disrepair. Population growth in San Diego further stresses an overburdened system.

Environmental changes on one side of the border do not stay there. The river flows across the international border without regard to municipal infrastructures, and environmental and economic regulations. What enters the river upstream always flows downstream. Because of this, neither Mexico or the United States can solve these problems without working together.

Trash on beach, Imperial Beach, California

Name: _____



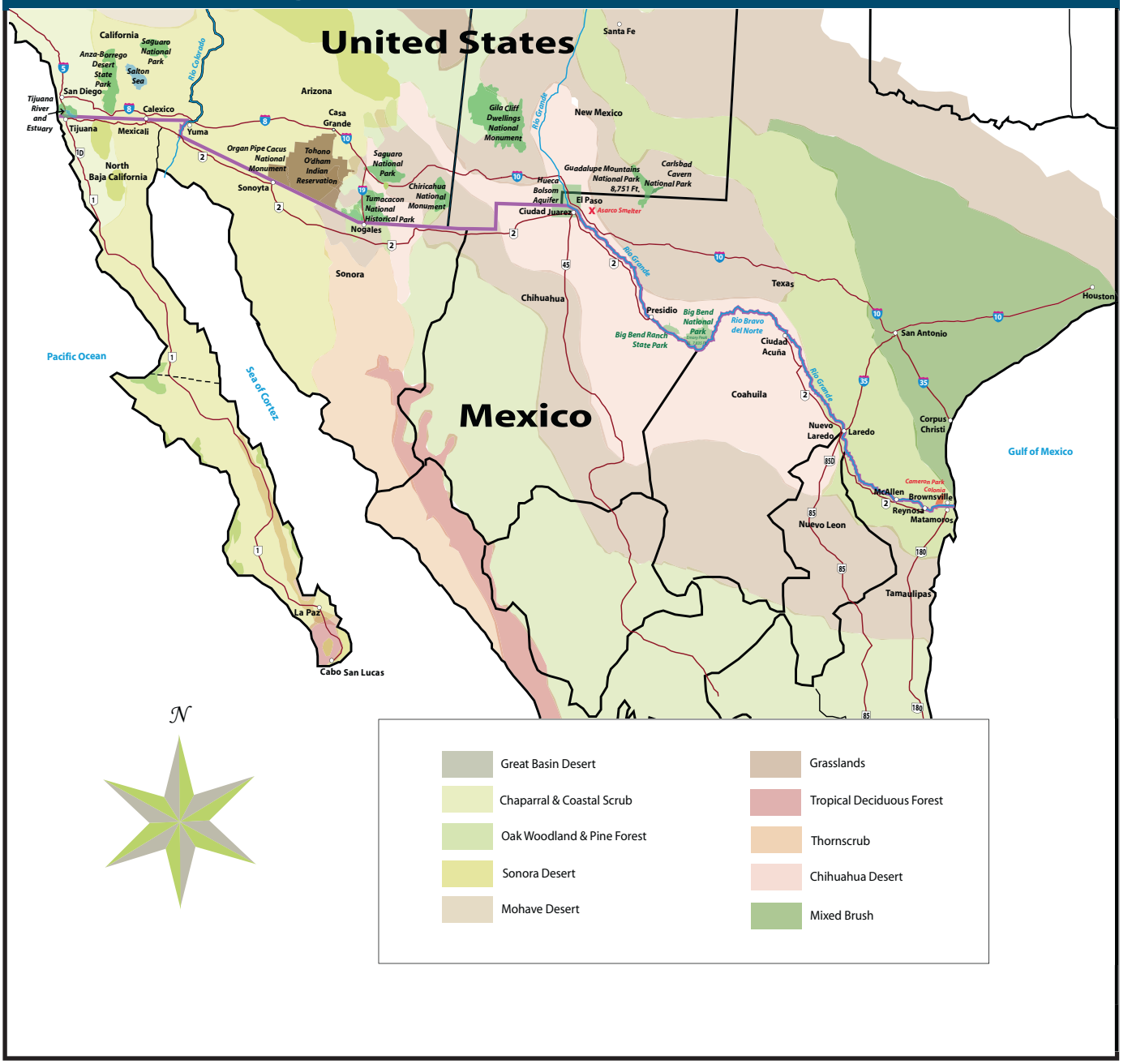
Questions to Answer After Class Discussion:

1. Why are the problems in the Tijuana River watershed important to both the United States and Mexico? _____

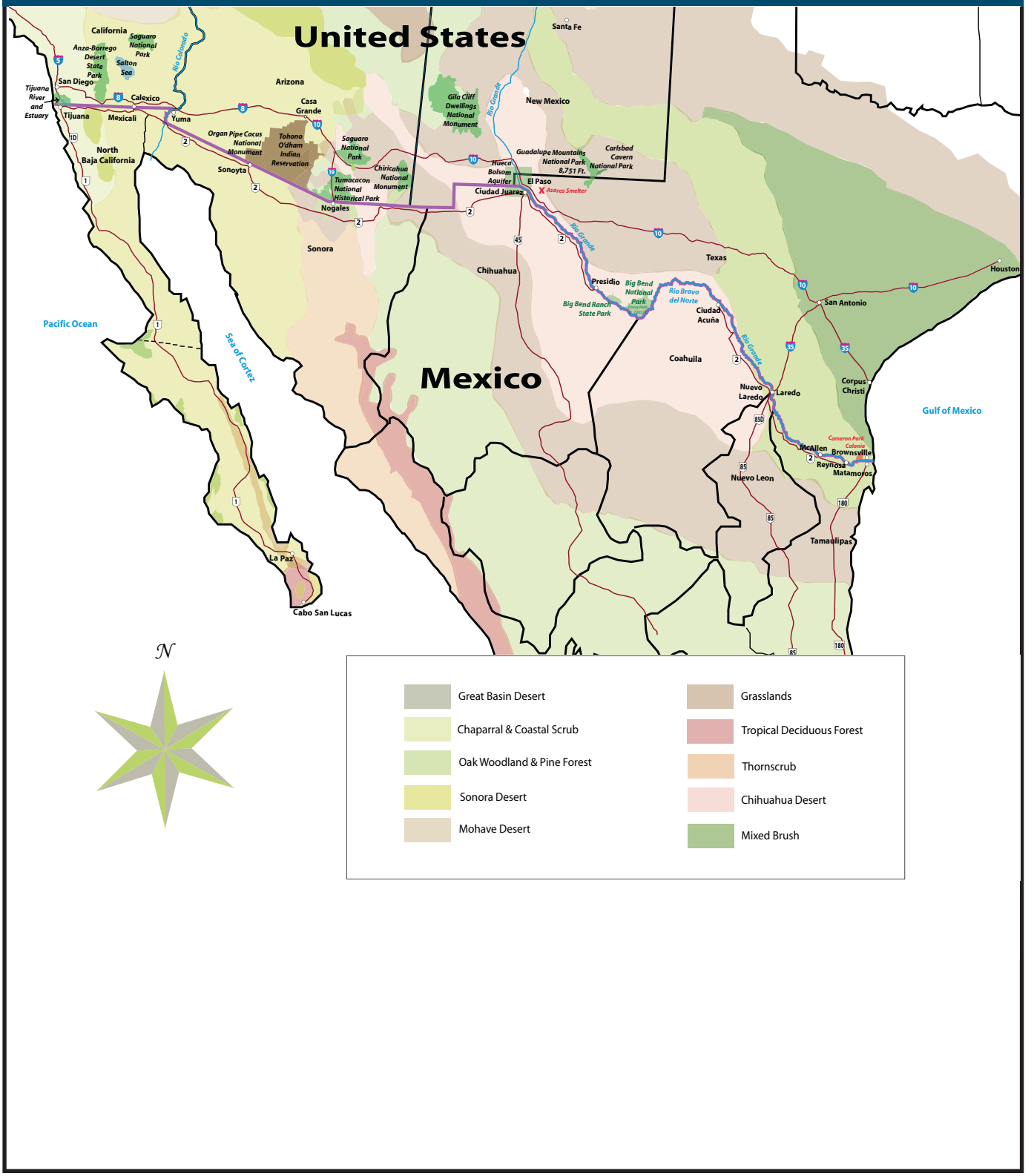
2. Why do the problems exist? What or who is/are directly involved in the problems? _____

3. How do these problems influence life in the border region? _____

Border Region Map



Border Region Map



Name: _____

Instructions: For each scenario card, locate the area discussed on your **Border Region Map**. Discuss the scenario with your partner. Then answer the following questions. (2 points each item)

Big Bend National Park

1. Describe the location, climate, and physical geography of Big Bend National Park.

_____

_____

_____

2. What is the environmental problem?

_____

_____

_____

3. What are the causes of the environmental problem?

_____

_____

4. Who or what does the environmental problem affect?

_____

_____

5. What is the issue in Big Bend National Park?

_____

Ciudad Juarez/El Paso Border Crossing

1. Describe the location, climate, and physical geography of Ciudad Juarez and El Paso.

_____

_____

_____

Name: _____

2. What is the environmental problem?

_____

_____

_____

3. What are the causes of the environmental problem?

_____

_____

_____

4. Who or what (human and natural systems) does the environmental problem affect?

_____

_____

5. What is the issue with the Cuidad Juarez/El Paso Border Crossing?

_____

Asarco Smelter (copper and lead mine) near El Paso

1. Describe the location, climate, and physical geography of the location of the mine.

_____

_____

_____

2. What are the environmental problems?

_____

_____

_____

Name: _____

3. What are the causes of the environmental problems?

4. Who or what do the environmental problems affect?

5. What is the issue with the Asarco Smelter?

Colorado River Basin

1. Describe the location, climate, and physical geography of the Colorado River Basin.

2. What are the environmental problems?

3. What are the causes of the environmental problems?

Name: _____

4. Who or what do the environmental problems affect?

_____

_____

_____

_____

5. What is the issue in the Colorado River Basin?

_____

_____

_____

_____

Big Bend National Park is located in southwest Texas. It encompasses more than 800,000 acres of diverse landscapes including vast deserts and rugged mountains. A tourist to this area in the 1970s could see for hundreds of miles. Today, however, changes in air quality and a significant increase in particulates make a clear view of the area a rarity. In fact, the National Park Service believes that Big Bend National Park has the dirtiest air of all parks in the west. Studies show that the pollution sources are mostly coal-burning power plants in Texas, Mexico, and the eastern United States. Urban areas in Texas are another source. The particulates from these power plants contribute to the haze in the national park and influence the natural and human systems present. The air quality is associated with respiratory illnesses in humans. The acid compounds in the air are starting to influence the grasslands as well.

Ciudad Juarez/El Paso Border Crossing is one of the busiest checkpoints connecting the United States and Mexico. Vehicle traffic is steadily increasing due to population growth and a fast growing economy. In 2001, more than one million trucks crossed the border between Ciudad Juárez and El Paso, Texas. Air quality is decreasing. In August 2003, the Texas Commission on Environmental Quality found that vehicles idling on the international bridges produced about 22% of area-source carbon monoxide emissions in the El Paso-Ciudad Juarez area. Waits of one hour or longer are common. Particulate matter emitted from older, long-haul Mexican trucks contributes much of the urban air pollution. Public health officials worry about this pollution. Scientists have connected the number of Infants and children suffering and dying from respiratory infections to the air quality in the region. The number of poor children being rushed to hospitals for these problems is steadily increasing.

Asarco Smelter (copper and lead mine) near El Paso is owned by the American Smelting and Refinery Company (Asarco). Asarco is a Mexican mining company with headquarters in the United States. By the 1920s, Asarco had the largest mining operation in Mexico. It had several plants located along the border, including a large copper and lead mine in El Paso, Texas. In 1969, El Paso had the highest concentration of lead in the air of any city in Texas. The plant employed more than 1,000 people in the 1990s. It produced almost 1 million tons of raw materials each year. Due to low copper prices, the plant closed in 1999. In this same decade, the water and soil in the El Paso area were found to have high levels of arsenic and lead. The U.S. Environmental Protection Agency determined that decades of emissions from the mine produced the contaminated soils. Citizens of El Paso, Texas, and Ciudad Juarez, Chihuahua, fear that the mining waste will eventually end up in the Hueco Bolson Aquifer, their primary source for drinking water.

The Colorado River Basin begins in the Rocky Mountains in Colorado. It drains southwest, ending in the Gulf of California. The Colorado River is one of the most litigated and legislated rivers in the world. It supplies water to the highly populated and arid southwest. Signed in 1922, the Colorado River Compact allocated 7.5 million acre feet to the Upper Basin states (Colorado, Wyoming, New Mexico, and Utah). The compact called for the same allocation to the Lower Basin states (Arizona, Nevada, and California). A treaty signed with Mexico in 1945 stated that Mexico should also receive 1.5 million acre feet. A total of 16.5 million acre feet are allocated. Yet studies show that, on average, the Colorado River delivers only 13.5 million acre feet annually. The quantity of water is not the only problem. As the water continues south, it becomes more and more contaminated with pesticides and salt from farms in the United States. By the time the water left in the river reaches Mexican cities and the Gulf of Mexico, the salinity and pesticide levels are so high, the water damages the ecosystems in the Gulf. That water is not safe to use in agriculture. The poor water quality has affected the health of the people and the economy in the region.

Big Bend National Park

Because air quality was diminishing on both sides of the border, the United States and Mexico formed a Binational Air Work Group in 1990. This group's purpose is to discuss the air quality issue. They began by trying to investigate where the pollution originated. But the two countries never came to an agreement over the source. Eventually, Mexico pulled out of the group and did not participate in further research.

Ciudad Juarez/El Paso Border Crossing

Both sides of the border are cooperating to address the issue of air quality in the region. Local communities, with the support of national agencies, are working to promote alternative fuels, like biodiesel. They are also making more fuel-efficient trucks available to Mexican drivers. The national governments are working to reduce idling from trucks on the international bridges. They are managing traffic better and making border crossings more efficient. El Paso and Ciudad Juarez are also using EPA grants to train mechanics to properly repair vehicle exhaust systems.

Asarco Smelting (copper and lead mine) near El Paso

In 1999, Asarco suspended operations in El Paso. The closing of the smelting plant was due to falling copper prices and because Asarco's air quality permit was not renewed. (The company applied to renew its state air quality permit with the states of Texas and New Mexico. Both states denied the company a permit.) Some cross border cooperation has occurred. The Mexican Senate's Border Affairs Commission hosted a binational forum on Asarco in 2005. At the forum, local lawmakers, non-governmental organizations, and federal agencies met to discuss Asarco. The group focused on air and soil quality issues, the mining operations, and safe cleanup of the by-products.

The Colorado River Basin

In 2005, seven states and the U.S. federal government began to renegotiate the water allocations for the states along the Colorado River. Various U.S. agencies have partnered with Colorado Basin communities to implement wetland restoration projects. Such projects help preserve natural systems along the river and improve the river's water quality. U.S. and Mexican authorities agree the two countries need to cooperate to improve water quality. They also need to increase water availability for people on both sides of the border. The two nations have begun discussing water needs and ways to protect the limited water source on both sides of the border.

Name: _____

San Diego, California, United States

- Access to municipal water: 99% of households
- Access to municipal municipal sewage: 98% of households
- Poverty rate is: 12.4%.
- Median household income is: $45,733.
- Main industries are: manufacturing, shipping, tourism, and agriculture.

Tijuana, Baja California, Mexico

- Access to municipal water: 80% of households
- Access to municipal municipal sewage: 85% of households
- Poverty rate is: 18.4%.
- Median household income is: $9,812.
- Main industries are: manufacturing, service, and tourism.

Yuma, Arizona, United States

- Access to municipal water: 98% of households
- Access to municipal municipal sewage: 98% of households
- Poverty rate is: 14%.
- Median household income is: $35,374.
- Main industries are: manufacturing, service, and agriculture.

Nogales, Sonora, Mexico

- Access to municipal water: 83% of households
- Access to municipal municipal sewage: 88% of households
- Poverty rate is: 33.9%.
- Median household income is: $22,306.
- Main industries are: manufacturing, agriculture, and tourism.

Presidio, Texas, United States

- Access to municipal water: 93% of households
- Access to municipal municipal sewage: 94% of households
- Poverty rate is: 43%
- Median household income is: $18,031.
- Main industries are: service and agriculture.

El Paso, Texas, United States

- Access to municipal water: 98% of households
- Access to municipal municipal sewage: 99% of households
- Poverty rate is: 20%.
- Median household income is: $32,124.
- Main industries are: manufacturing, agriculture, and service.

Patterns/ Relationships in the Data:

Name: _____

Questions to Consider: (5 points each)

1. What is the effect of population growth in areas where water, air, and land are already issues?

2. How does the infrastructure in U.S. border cities differ from that in Mexican border cities? How might this affect the environment?

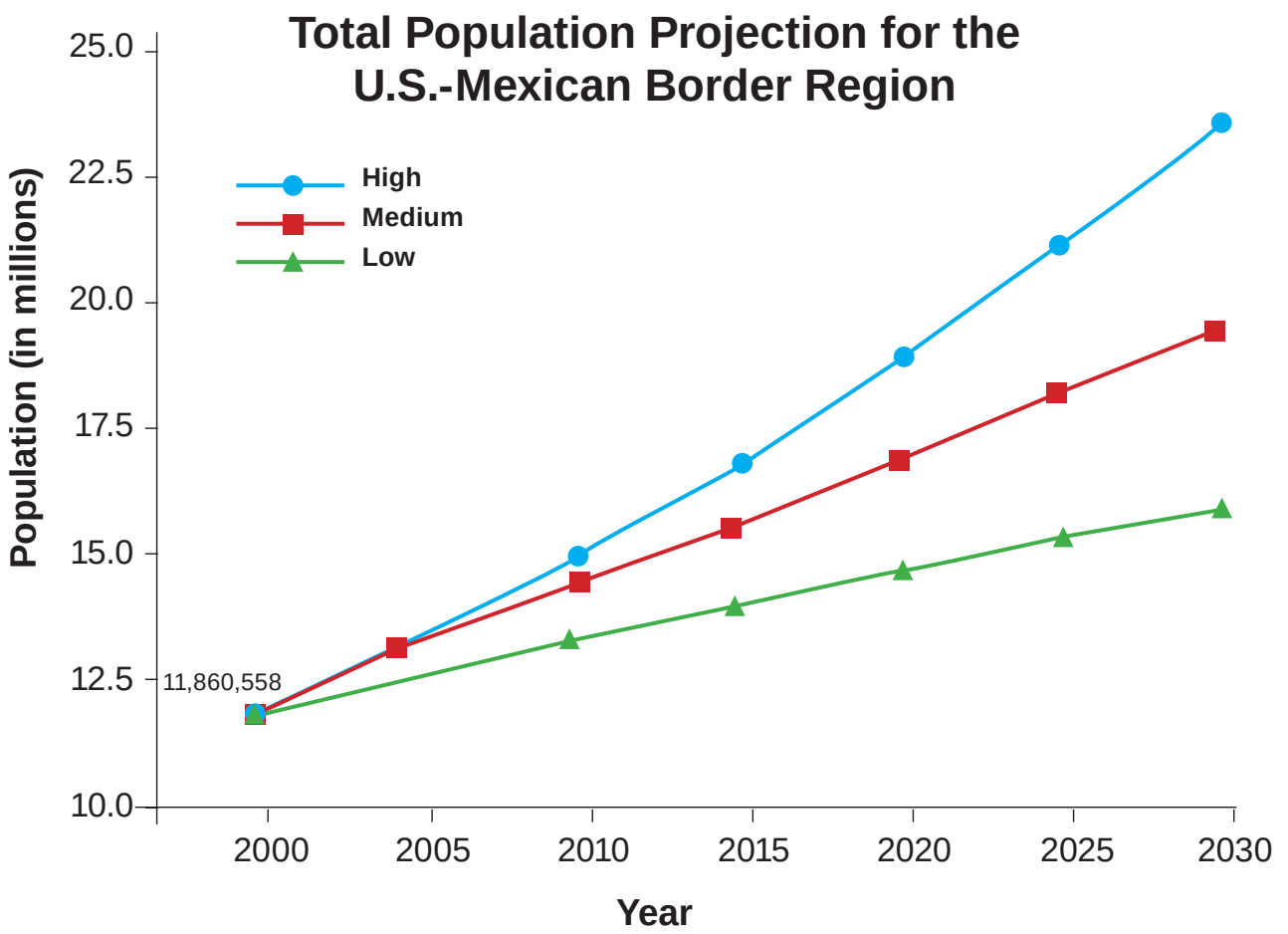
3. Why should the United States care about the infrastructure and population growth in Mexico's border cities?

4. Based on the information in this lesson, what two questions would you like to ask members of the U.S. or Mexican governments? Write your questions here:

Population Data for Six Border Cities

City	Area, square miles (square kilometers)	Population Density, people per square mile (people per square kilometer)
San Diego	372 (964)	3,871 (1,494)
Tijuana	246 (637)	5,727 (2,212)
Yuma	107 (276)	725 (281)
Nogales	647 (1,675)	1,002 (387)
Presidio	2.7 (7)	1,623 (626)
El Paso	251 (649)	2,260 (874)

Population Graph



J. Peach and J. Williams. 2003. "Population Dynamics of the U.S.-Mexico Border Region." Unpublished, forthcoming SCERP Monograph. San Diego: SCERP/SDSU Press.

U.S.-Mexico border at Rio Grande River in Texas

Background on the Rio Grande or Rio Bravo

The Rio Grande or Rio Bravo (its name in Mexico) begins in the Rocky Mountains in Colorado. It runs south through New Mexico. Eventually, the river becomes part of the international border between the United States and Mexico. Two major concerns involving the Rio Grande are water allocation and water quality.

This river is the center of an international controversy pitting the United States against Mexico. Several factors have created a water shortage problem in some parts of the Rio Grande. This area has endured an ongoing drought since the 1990s. The drought has resulted in groundwater depletion. It has also limited the amount of water Mexico can give Texas. An international treaty in 1944 called for Mexico to "allocate" or give Texas a certain amount of Rio Grande water. Mexico currently owes the United States 1.4 million acre-feet of water under the provisions of the treaty. Due to the severity of the drought, however, Mexico has been unable to fulfill the agreement. The water availability becomes an increasing concern as the population in the region grows. Related concerns are growth of invasive aquatic weed species and river flow. Invasive species such as the water hyacinth consume large amounts of

water. Growing demand, drought, and invasive aquatic weeds have reduced the flow in the Lower Rio Grande. As a result, sandbars have formed and now prevent water from flowing to the Gulf of Mexico. The effects downstream are very detrimental, influencing the Lower Rio Grande agricultural region, the natural systems, and the communities downstream. Experts estimate the economic impacts at $400 million annually.

One major issue with the Rio Grande is water quality. The population of the region along the river is growing rapidly. The wastewater infrastructure is not adequate to keep up with the population growth. Thus, people in the region have little access to safe water. Raw sewage increases levels of bacteria. The increased bacteria levels in turn increase the risk of humans contracting diseases like hepatitis A. Agricultural runoff increases levels of nutrients in the water and decreases oxygen levels. These changes influence the natural river systems. Water quality issues are especially problematic for the poorer communities in the area, including indigenous groups, farmers, and *colonia* residents. Many have little access to potable water or adequate sewage treatment facilities.

Water tank at a Mexican home

Tractor spraying chemicals on field

The environmental issues surrounding the Rio Grande are binational. As a result, two nation's federal agencies are working together to assess and address water quality and water allocation issues that influence the region around the Rio Grande. The U.S. Environmental Protection Agency (U.S. EPA) is one of those agencies. The *Secretaria de Medio Ambiente y Recursos Naturales* (*SEMARNAT*) is the other. The two agencies have created a binational program to improve the natural and human systems in the region.

Border Environmental Cooperation Commission-(BECC) (Group 1)

As part of the North American Free Trade Agreement, Mexico and the United States created the BECC in 1993. Its purpose is to "help preserve, protect and enhance the environment of the border region in order to advance the well-being of the people of the U.S. and Mexico." To do this, the BECC assists states and local agencies in developing projects to increase infrastructure in the border region, analyze environmental projects, and evaluate the social and economic benefits of the projects. It is a binational group with headquarters in Ciudad Juarez and El Paso. The BECC has been responsible for numerous infrastructure projects—from wastewater treatment plants to sewage upgrades.

As a member of the BECC, you are very concerned about the storm sewer network in the city of Nuevo Laredo, Tamaulipas. The current system contains pipes that have deteriorated. Serious flooding occurs during rain storms. When the roads flood, the storm water runs into the sanitary sewer. Untreated sewage then flows into the Rio Grande. As a result, the people of Nuevo Laredo face increased risk of contracting water-borne diseases. The sewage continues downstream, affecting hundreds of thousands of other people and ecosystems. Your hope is to not only attain the money needed for this project, but to generate support from local people, organizations, and federal agencies. The project will require generous financial support as well as patience in completing the project.

Santa Fe Environmental Group (Group 2)

You are members of a Santa Fe environmental group that has filed a lawsuit against the U.S. government. Your group blames the government for the plight of the Rio Grande silvery minnow. The Endangered Species Act protects that fish, one of five native species of fish left in the Rio Grande. Yet it is in danger of becoming extinct—and you believe it is the government's fault.

The Rio Grande silvery minnow was once one of the most abundant species of fish in the Rio Grande watershed. Due to drought, dam construction, water extraction, and poor water quality, the minnow has disappeared from 95% of its habitat. Most of the water in the Rio Grande is allocated to municipal, industrial, and federal use. There just isn't enough water in the Rio Grande to support the silvery minnow. A Conservation Water Agreement between New Mexico and the federal government provided for 100,000 acre-feet of water to be set aside for endangered species. However, because of the severe drought over the past 10 years, the federal government had to use water that was supposed to be set aside for endangered species. The silvery minnow population has continued to decline.

Many environmentalists think of the silvery minnow as "the canary in a coal mine" for the Rio Grande. The health of the silvery minnow foretells the health of the river. Your group believes that the death of the silvery minnow in the wild means the death of the larger Rio Grande ecosystem.

U.S. Fish and Wildlife Service (Group 3)

You work for the Fish and Wildlife Service, an agency of the U.S. government. You are concerned about freshwater ecosystems in Texas. These ecosystems contribute to the natural and human systems. Freshwater in Texas is an economic source for tourism, agriculture, and urban development. It also is home to many endangered aquatic species. Of the more than 170 freshwater fish species found in Texas, more than 20 are threatened or endangered. Environmental changes like dam construction, irrigation, salinization, non-native species, and pollution all influence the fish and wildlife that inhabit the streams.

These environmental changes influence the natural systems and the freshwater aquatic species, in some cases changing the entire ecosystem. Monitoring the ecosystems and evaluating the human effect on the streams is important to you, as is understanding the relationships between human activities and natural systems. Your studies provide a guide as to what human activities influence the natural systems and what changes must occur in order to preserve natural habitats. Fish are good indicators as to the environmental health of a stream. Studies show that humans have introduced over a dozen non-native species to Texas and that at least 20% of fish species need conservation efforts, as does the aquatic environment.

Residents of Ciudad Juarez, Mexico (Group 4)

You live in Ciudad Juarez, the largest border city along the Rio Bravo. Domestic water use remains one of the major issues for the city. Agriculture uses all of the water Ciudad Juarez receives from the Rio Bravo. The residents must draw from the Hueco Bolson aquifer, a large underground reservoir, for household use. However, humans are extracting water in the aquifer at a faster rate than it is recharging. Therefore, many residents in the city must use one of the 145 wells located in the city. The city should close some of these wells because the water is polluted due to the lack of wastewater treatment facilities. The problem is especially serious in the downtown area.

One solution to the city's water issue is to clean the water in the Rio Bravo so residents could use it. Then farmers could tap into alternative water supplies like the Mesilla Bolson and Bismarck Aquifers. The main issue is how to restore and clean the water in the Rio Bravo. Some have suggested building a water treatment plant on the Mexican side of the border to clean the incoming water from upstream. However, such a plant is costly, and the Mexican federal government has not been able to dedicate enough money to build a plant. Your group would like to see the Border Environment Cooperation Commission (BECC) and the North American Development Bank (NADB) support this project. Building a treatment plant on the Rio Bravo would allow the residents of Ciudad Juarez to use the river as a source for drinking water. Residents would no longer have to walk to one of the wells, gather the water, and carry it back to their homes. It would also give the citizens of the city hope for the future: they would know that clean, potable water would be available for years to come.

City Planner in Brownsville, Texas (Group 5)

As a member of the city planners in Brownsville, Texas, you want to allow for growth in the region, but you are also concerned about biodiversity. Developers have begun and want to continue to drain the resacas to provide land for housing developments. Resacas are former channels of the Rio Grande that have been cut off from the river due to land development and construction of levees and dams. Brownsville has over 3,500 acres of resaca habitat. The water used to empty into the Rio Grande during times of flooding, but with development the water remains stagnant. There is a lot of wildlife found in these wetland areas and the water today is used for drinking water, residential use, and agriculture. The condition of the resacas has been deteriorating due to the low flow. The shallow water contains high levels of heavy metals, automotive oil, sewage, and pesticides. Recent studies of fish in the resacas have found high levels of heavy metals in the fish tissue.

Draining the resacas seems like a good idea because Brownsville needs more land for the growing population; however, the resacas still provide aquatic habitats for a variety of fish, reptiles, and birds. The pollution in the resacas is beginning to influence the wildlife and plants, and if the city continues to use the water for drinking, then the area needs to be restored. Financially, the city would benefit from having more housing, and it would be less costly than trying to preserve the ecosystems.

Maquiladora Owners (Group 6)

You are some of the many maquiladora owners in the U.S.-Mexico border region. Maquiladoras exist in many parts of Mexico, but there are more in the border region than anywhere else. Many residents view the maquiladoras in the border region as the source of the environmental problems that exist, including poor water quality and contaminants in the soil. However, every story has at least two sides.

The maquiladoras you own have brought jobs to the border region. Very few factories break any of the environmental laws set out by the U.S. and Mexican governments. The maquiladoras are obligated to return any waste produced in the factories to their country of origin for disposal. Many owners, such as you, do just this. As for those who break the law, you believe that the Mexican government needs to do its part in enforcing the environmental laws in the region. The water quality in the Rio Grande is declining, but that is not just from maquiladoras. Population growth in the area is the real issue.

The ecosystem in the area is fragile, and the increase in population in the region is influencing the natural systems. However, the maquiladoras are increasing the economy in the area, providing more money for use in solving environmental problems. The maquiladoras employ over 1 million workers, and opportunities are abundant. As maquiladora owners, you believe that the services you provide are important. Communities and local government officials are responsible for taking care of the environment.

Farmers in Northern Mexico (Group 7)

You are members of a group of sugar cane farmers who live in Northern Mexico. Your families have lived on the land you till for generations. Your fathers and grandfathers produced cotton using water from the Rio Bravo basin. You began your farming careers growing cotton too, but the past 20 years have seen the water quality and quantity decline. Because of this, you have had to switch from growing cotton to raising sugar cane. Even though sugar cane is a water-intensive crop, it does not require as much water as cotton. Years of drought have forced you to stop farming some of your land because you do not have enough water. Farming less land meant you grew less sugar cane and made less money for your family.

You could use water more efficiently. The type of irrigation system you use is not efficient, but you do not have the money to switch irrigation methods. Because irrigated agriculture accounts for a large portion of water use in the region, governments are encouraging farmers to use more efficient irrigation systems. The Mexican government would like farmers to start using more efficient systems, like the drip system, but the government does not have money allocated to help the farmers do this.

Some government officials have discussed raising the price of water. Higher prices would force farmers to change irrigation systems or start planting crops that are not as water-intensive. But this idea is challenging. Sugar cane is a perennial crop that comes back every year. To change crops now, after already investing money in sugar cane, would not be economically feasible. As it is, your family can barely get by. Changing the irrigation system or crops would not be possible unless the government provides financial and technical assistance.

The Kikapu (Group 8)

The Kikapu are a North American Indian people who originated in the the Great Lakes area. Over time, the U.S. government forced them to move south. Today, they live in Kansas and Oklahoma, as well as along the Rio Grande in northern Mexico and southern Texas. As a Kikapu, you graze cattle on the land and also cultivate wheat and other crops. Much of the land was under the ejido system, meaning that the government owned the land and your group lived on the land communally. However, in 1991, Mexico eliminated the system, citing low productivity. The government sold much of the land to corporations and some farmers. Because of the poverty rate among most indigenous groups, including yours, you can not afford to buy the land you farm. You also have little access to services like telephone, mail, and health care.

Historically, in some parts of the nation, large-scale water rights have not included American Indians. In California, however, Indian tribes have water rights. For example, the tribes have a significant influence on the management of the Klamath River. Nor do many of these groups have legal representation to help them attain rights to the water. In the 1940s, the American Smelting and Refining Company (Asarco) pumped out excessive amounts of groundwater, leaving your community unable to support yourselves. Today you must use channeled or diverted water to irrigate your crops. In the desert environment where you live, droughts and issues with water quantity and quality greatly affect your community. The by-products from power plants located in Coahuila, Mexico, and Eagle Pass, Texas, directly affect the air, water, and soil where you live. Many members of your community have complained of sickness and eye irritation from the quality of water in the Rio Grande.

Name: _____

Instructions: After reading about and discussing your stakeholder group, answer the following questions:

1. Who is your group representing?

2. How is this stakeholder or group of stakeholders connected to the Rio Grande?

3. What is your role in the group?

4. What do you need to do to prepare for the conference?

Name: _____

Complete the following table while you are listening to the presentations. Fill in the column for your own group as well.

Stakeholders	Where is the group located in relation to the Rio Grande?	How does the river affect the group? How does the group affect the river?	What factors influence the group's decisions about the river?	What are the group's goals for the river?
Border Environmental Cooperation Commission				
Santa Fe Environmental Group				
U.S. Fish and Wildlife Service				
Residents of Ciudad Juarez, Mexico				

Conference Notes

Lesson 4 Activity Master | *page 2 of 2*

Name: _____

Complete the following table while you are listening to the presentations. Fill in the column for your own group as well.

Stakeholders	Where is the group located in relation to the Rio Grande?	How does the river affect the group? How does the group affect the river?	What factors influence the group's decisions about the river?	What are the group's goals for the river?
City Planner in Brownsville, Texas				
Maquilladora Owners				
Farmers in Northern Mexico				
The Kikapu				

Who Are the Stakeholders?

- Border Environmental Cooperation Commission (BECC)
- Santa Fe Environmental Group (flag of Santa Fe)
- U.S. Fish and Wildlife Service (official symbol)
- Residents of Ciudad Juarez, Mexico (official city seal)
- City Planner in Brownsville, Texas (official city seal)
- Maquiladora Owners
- Farmers in Northern Mexico
- The Kikapu

Conference Roles

Speech Writer
Responsibilities: Writing a three-four minute speech about your stakeholder group. You must include:

- background on your group (who you are, where you are located)
- how you influence or are influenced by the Rio Grande/Rio Bravo
- what factors affect your decisions about the river
- your goals involving the river

Speaker
Responsibilities: Presenting the three-four minute speech at the "Conference on Environmental Partnerships." Because you are presenting the speech, you should practice reading the speech before the conference. You may also be involved in writing the speech. You should also be familiar with the map you will show the audience during your presentation at the conference. That map is being made or found by your Cartographer.

Cartographer
Responsibilities: Creating or finding a map that shows where your group is located and how it is connected to the Rio Grande/Rio Bravo. (If your group is the Border Environmental Cooperation Commission (BECC) or U.S. Fish and Wildlife Service, you should prepare a general map of the region that shows the main cities and communities as well as where the river flows.)

Conference Roles

Researcher/Editor
Responsibilities: Making sure the content presented in the handout and speech is accurate, the content on the map is accurate, and vocabulary is used correctly. While the other members of the group are writing and preparing maps, you should help provide content to be included in the speech, map, and any handouts your group chooses to give out.

Designer of Handout (Optional)
Responsibilities: Creating a handout to share with the other conference members. The handout should include some background on your group, how you are connected to the Rio Grande/Rio Bravo, your goals, and how you suggest attaining those goals.

Agenda for the Conference

Welcome to the first annual **Conference on Environmental Partnerships between the United States and Mexico.** We have come together today to learn about the people and organizations that care about and are influenced by the Rio Grande/Rio Bravo. As the population continues to increase in the border region, concern grows regarding the quality of water and having enough water available for people and businesses on both sides of the border.

We will begin by having each stakeholder group present their perspective. Each group has five minutes to present. The groups will present in the following order:

1. Border Environmental Cooperation Commission (BECC)
2. Santa Fe Environmental Group
3. U.S. Fish and Wildlife Service
4. Residents of Ciudad Juarez, Mexico
5. City Planner in Brownsville, Texas
6. Maquiladora Owners
7. Farmers in Northern Mexico
8. The Kikapu

During the presentations, take notes, using the Conference Notes form (Lesson 4 Activity Master), on how the other groups are connected to the Rio Grande. Once all groups have presented, we will discuss some questions as a group.

The La Paz Agreement

The United States and Mexico first began to work together to address environmental problems in 1983. That year, the presidents of both countries signed the La Paz Agreement. The main goal of the La Paz Agreement was to protect and improve the environment of the border region. The agreement had three important parts.

The first part defined the border region as the area 62 miles (100 kilometers) north and south of the actual border. The two nations still use this definition of the border region today.

A second part of the agreement formed several working groups. Each working group specializes in a specific environmental issue: water, air, land, pollution prevention, and enforcement of environmental laws. Experts from both sides of the border serve on each of the working groups.

A third part of the agreement identified problems of immediate concern to both nations. These problems are sewage and waste in the Tijuana River, poor infrastructure in the border cities, illegal movement of hazardous waste from the United States into Mexico, and air pollution in the urban areas and at the border crossings.

Since the two nations signed the La Paz Agreement, progress has occurred, especially in addressing air quality problems. The La Paz Agreement opened up the dialogue between the United States and Mexico and created a structure for cooperation. However, in the decades following the agreement, environmental conditions along the border continued to deteriorate. Some critics complain that progress is too slow. The La Paz Agreement does not specifically require enforcing the two nation's domestic environmental laws. Questions about the effectiveness of the agreement remain.

Trash and erosion–Los Laureles Canyon, Tijuana

Even with the concerns about the effectiveness of the agreement, the United States and Mexico continue to use this agreement. It has paved the way for other agreements. Several programs, including the Border 2012 Program (which another group is examining), were created to support the La Paz Agreement and resolve the issues it identified in 1983.

NAFTA's Environmental Provisions

Canada, the United States, and Mexico signed the North American Free Trade Agreement (NAFTA) in 1993. This agreement had the goal of increasing trade through lowering tariffs and other federal laws that served to regulate commerce between the countries. At the time, many people were concerned about how the lowering of these trade barriers would affect the environment. What would happen if one country had weaker environmental laws than the others? Many companies would race to open factories in that country to avoid the cost of proper waste disposal or of meeting emissions standards. The other concern was that more trade would increase population and industrial growth in the region. This growth would affect the ecosystems of the border region. Because of these concerns, the United States and Mexico felt it was important to include environmental provisions in the trade agreement.

The leaders of Canada, the United States, and Mexico signed the North American Agreement on Environmental Cooperation (NAAEC) along with NAFTA. This agreement created the Commission for Environmental Cooperation (CEC). The CEC's goal is to improve environmental cooperation among the countries by providing a process for airing public concerns and settling disputes. The CEC also has the power to fine countries if they fail to enforce their own environmental laws.

The NAAEC recognized that, in order to protect and improve the environment of the border region, environmental projects needed monetary support. Therefore, the agreement called for creation of two additional groups: The Border Environmental Cooperation Commission (BECC) and the North American Development Bank (NADB). The BECC helps communities in the border region design projects that will help improve and protect the environment. The NADB helps the community determine the costs of their projects. Once the cost is determined, NADB decides whether or not to give money to the community to begin the project.

People have several concerns regarding the NAAEC. First, NADB relies on the United States and Mexico to contribute equal amounts of money to support the projects that the communities create. Many wonder if it is fair to ask all the countries to contribute the same amount of money. A second concern is that NAFTA is a trade agreement, not an environmental agreement. Some believe that environmental issues will not get enough attention as part of a trade agreement, where improving the economy, not the environment, is the goal.

Maquiladora or assembly plant

Border 2012 Program

The Border 2012 Program began in 2002. Its overall goal is to help carry out the efforts Mexico and the United States are making under the La Paz Agreement of 1983. It is active in the 14 "sister-cities" along the U.S.-Mexico border. Overall, the Border 2012 Program has six specific goals:

- Goal 1: Reduce Water Contamination
- Goal 2: Reduce Air Pollution
- Goal 3: Reduce Land Contamination
- Goal 4: Improve Environmental Health
- Goal 5: Establish Emergency Preparedness and Response Protocols
- Goal 6: Promote Environmental Stewardship

The Border 2012 Program is currently working on six projects. The first is providing adequate and clean water to the human and natural systems in the region. The second is improving the air quality in the region by decreasing the emissions from cars, industry, and urban sources. The third is decreasing land contamination resulting from the improper disposal of solid and hazardous waste. The fourth task is improving the health of the people who inhabit the region. The fifth task is developing an emergency response plan in the event of a natural or human–caused disaster in the region. The sixth task is increasing the environmental responsibility of local industries, especially the maquiladoras. The plan is to solve these problems and documented improvements by the year 2012.

The approach of the Border 2012 Program differs from that provided for in most treaties and agreements. The traditional approach involves decisions made by government officials, far away from the affected region. In the Border 2012 Program, local people and communities give their input and make decisions. People from the ten border states as well as the Indian nations living in the border region can actively participate in decisions about their environment.

Oil tank washed up on beach

The Border 2012 Program has been very successful in looking at the environmental problems, planning for changes, and implementing the changes. All interested parties in the border region continue to support the program.

Name: _____

Instructions:

1. In your expert group, read the background on your agreement or program. Use that information to fill in the appropriate column. Discuss the information with members of your group to be sure you understand the agreement and can teach your classmates about it.

2. You will join a group of three with members of the other two expert groups. In your new group, teach the other students about your international agreement or program using the chart on page 2 to organize your presentation.

3. When the other two members of your group teach about their agreements or program, fill in the information they give you in the appropriate columns.

   How and why do environmental issues influence international politics?

Name: _____

Getting the Details of:	The La Paz Agreement	NAFTA's Environmental Provisions	Border 2012 Program
What is the background of the agreement/ program? (When was it signed? What came before it? Why was it created?)			
What are the main goals of the agreement or program?			
What, if any, are the drawbacks of the agreement/ program?			

The Tijuana River

Part 2: Working Together to Find Solutions

In 2003, the mayors of Tecate and Tijuana became board members of the Tijuana River National Estuarine Research Reserve. The group aims to improve relations and management strategies on both sides of the river.

Researchers from both countries monitor water quality and wetland species. They propose ways to restore the health of the estuary. Restoration projects include constructing sedimentation basins that catch sediment and debris, as well as digging sediment from filled marshes and removing non-native plant species that threaten native plant communities. In addition, the Reserve runs a visitor center to educate the public. Representatives of the Reserve also work with Mexican agencies to train teachers on both sides of the border.

In 2006, the City of Tijuana and the State of California worked together to clean up Los Laureles Canyon. The canyon had become home to an unplanned housing

Tijuana Watershed–Los Laureles Canyon, Tijuana, Mexico

Water testing at Tijuana estuary

development. The Mexican city and California created a sewage treatment plant and helped restore the natural waterway. They also organized riverbank cleanups. The U.S. Environmental Protection Agency also cooperates with many organizations in both the United States and Mexico to support wastewater projects in the area. The goal of these projects is maintaining the health of the border region. Recently, researchers from Mexican and U.S. universities developed a Tijuana River atlas. This atlas includes maps, photographs, and information about topography, climate, population, and land use in the Tijuana River watershed. Policymakers and planners in both countries can use this atlas to help make decisions. This binational project is a first step toward building communication and partnerships.

Current efforts to better manage the valuable resources of the Tijuana River are taking a "grassroots" approach. This means educating and working with people living in the watershed on both sides of the river. The goal is to give residents a sense of long-term stewardship, to encourage them to accept individual responsibility. Local outreach programs and restoration projects are underway in San Diego, Tecate, and Tijuana. These programs and projects encourage people to become aware of the issues that affect the river, as well as possible solutions. If the people of the Tijuana River watershed have the knowledge, tools, and support to co-exist with the natural environment, they will be able to make a difference on both sides of the border.

Gathering trash on International Coastal Clean-up Day

Name: _____

1. How are people addressing the environmental issues in the Tijuana River watershed?

2. Describe some problems in the Tijuana River watershed that still might be a concern.

3. With all that people are doing to solve environmental problems in the watershed, why are there still problems? What factors are affecting progress?

Map of the Tijuana River and Estuary

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